Flying Safety

HEADQUARTERS UNITED STATES AIR FORCE

APRIL 1960

REFERENCE COPY

COVER

Weathermen are probing the polar regions for a better understanding of Arctic Weather. One of the latest contributions is their study of the effect of snow and ice fields on flying weather, which promises better forecasts for pilots who fly Arctic missions such as those flown by men of the 57th Fighter Wing, whose jets are pictured on the cover. See page 18 for the story, "The Ice Cap and Arctic Weather."

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FLYING SAFETY PENNANT AWARDS

For the best records during the Three-Month period ending 31 December 1949.
(Stars denote number of times previously awarded)

B-17
- Green Pennant (3 Stars)—Eglin AFB, Fla. ..... APG
- White Pennant—Wright-Patterson AFB, Ohio ..... AMC

B-25
- Blue Pennant (4 Stars)—Mather AFB, Calif. ..... AFTRC
- Green Pennant—Randolph AFB, Texas ..... AFTRC
- White Pennant—Marshall AFB, Kansas ..... CONAC

B-26
- Green Pennant—Eglin AFB, Fla. ..... APG
- White Pennant—Scott AFB, Ill. ..... AFTRC

B29
- Green Pennant—Biggs AFB, Texas ..... SAC
- White Pennant—Offutt AFB, Neb. ..... SAC

C-45 (T-11, T-7, CG-3, F-2)
- Blue Pennant—Kirtland AFB, N. Mex. ..... AMC
- Green Pennant—Boston-Bedford Arpt., Mass. ..... CONAC
- White Pennant—Langley AFB, Va. ..... CONAC

C-46
- White Pennant (1 Star)—Hamilton AFB, Calif. ..... CONAC

C-47 (C-53)
- Blue Pennant—Tinker AFB, Okla. ..... AMC
- Green Pennant—Mitchel AFB, New York ..... CONAC
- White Pennant—Walker AFB, N. Mex. ..... SAC

C-54
- Blue Pennant—Great Falls AFB, Mont. ..... MATS
- Green Pennant—Wright-Patterson AFB, Ohio ..... AMC

F-51
- Blue Pennant—Las Vegas AFB, Nev. ..... AFTRC
- Green Pennant—Tyndall AFB, Fla. ..... AU
- White Pennant—Williams AFB, Ariz. ..... AFTRC

F-80
- Blue Pennant—Selfridge AFB, Mich. ..... CONAC
- Green Pennant—Wright-Patterson AFB, Ohio ..... AMC

T-6
- Blue Pennant—Williams AFB, Ariz. AFTRC
- Green Pennant—Selfridge AFB, Mich. ..... CONAC
- White Pennant—Wright-Patterson AFB, Ohio ..... AMC

MISCELLANEOUS
- Blue Pennant—Greenville AFB, S. C. ..... CONAC
- Green Pennant—MacDill AFB, Fla. ..... SAC
- White Pennant—Washington National Arpt., D. C. ..... MATS

~~RESTRICTED~~

FLYING SAFETY

DEPARTMENT OF THE AIR FORCE

The Inspector General, USAF, Directorate of Flying Safety, Norton Air Force Base, San Bernardino, California

Volume 6 No. 4 **April 1950**

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GUEST EDITORIAL

FLYING SAFETY
IN THE
MILITARY AIR TRANSPORT SERVICE

A YEAR ago this month, a rise in the aircraft accident rate of the Military Air Transport Service led us to make a searching re-evaluation of our flying safety program.

The facts were that our accident rate was rising; that we would not accept increases in our accident rate; that advice, assistance and action was required in MATS Headquarters and throughout the organization. We agreed that the Air Force directives on flying safety were sound and comprehensive. We believed that the cause for the rise in our accident rate was the lack of a feeling of individual responsibility and personal attention to flying safety down through the chain of command. I made it clear that in the Military Air Transport Service organization it is I who am responsible for flying safety. The Chief of Staff, U. S. Air Force holds me responsible—and no one else—not my Director of Operations, not my Chief of Flying Safety, but the Commander himself.

In a similar manner within MATS, it was made clear that I held personally responsible the nine major commanders in our organization—not their Flying Safety Officers or any other assistants, but they themselves. The responsibility of those nine individuals extended to each airplane and pilot in their organization, and every aircraft and pilot coming under their operational control.

A second action was to insure that complete and correct action was taken on the accident reports we received. This involved the Commander, MATS knowing the exact disposition, for example, of the responsible individuals in accidents due to pilot error and of the personnel involved in accidents charged to maintenance. This was not a punitive approach; we are primarily interested in preventing accidents, but insist that we do not repeat accidents.

A third action to make this concept of the air safety in MATS work was to remove the staff function of flying safety from the inspection category and place it in operations. This made the Director of Operations my staff advisor on the subject of flying safety as well as other aspects of operations within the whole organization of MATS. That action did not relieve the Inspector General of his broad interest in flying safety; for a prominent element of our basic mission is safe, economical and regular air transportation.

This general program was given serious reception and vigorous implementation throughout the command. It was reflected in intensified training in the recognition and acceptance of responsibility for basic job assignments, coupled with energetic, conscientious supervision of those activities for which each officer and airman was responsible.

In December 1949, the Chief of Staff, United States Air Force expressed his satisfaction in the fact that the accident rate for MATS on nonscheduled operations then approximated the low rate repeatedly shown in the scheduled phase of MATS operations. His letter said, in part:

"That MATS has approached its outstanding problem with thoroughness and efficiency is displayed by your noteworthy achievement. The evident tightening of accident responsibility and control may well be the primary factor in obtaining such excellent results."

Of course, in MATS, we do not feel that we have an original solution of the air safety problem or that we have it licked, but we do believe we have a solid approach and so long as we have the outstanding performance of duty enjoyed in the past year MATS will continue to fly safely.

LAURENCE S. KUTER
Major General, USAF
Commanding

BUILDING SAFETY INTO ENGINEERS

By CAPT. C. E. THOMSON
USAF INSTITUTE OF TECHNOLOGY

THE student in Aeronautical Engineering thought his professor had been rather stiff in grading an exam paper. "Five points off for a misplaced decimal point," he moaned. "Just one little dot in the wrong spot and—blooey, five points."

The instructor acknowledged that his student may have known the correct answer. "But putting that point in the wrong place, even by mistake—through thoughtlessness or carelessness—is enough to warrant a five-point penalty."

In this instance, the student could see no justice in the grading. He went over the professor's head, secured an audience with the Commandant who reviewed the matter on the spot.

"Had I been your instructor," the Commandant told him, "I'd have taken *ten* points off. The important thing is that I—along with yourself and many others—might one day be flying an aircraft for which *you* had done the computations."

Thus the case was closed.

Like everywhere else in the Air Force, safety today sits as a potent spirit in each classroom at the USAF Institute of Technology at Wright-Patterson Air Force Base. Its presence is felt in every course taught within the two colleges of Industrial Administration and Engineering Sciences. Flying safety has applications in logistics, in aircraft supply and maintenance and industrial mobilization planning as well as in the more obvious areas of design and development engineering. And all of these fields are the Institute's business.

At USAFIT, the USAF is building safety into the engineers and planners who will in turn build it into the cockpits and pilots of tomorrow. This is being done *coincidentally* within the Institute's broad program aimed at assuring a steady supply of technically developed brainpower to match air material developments. Safety-consciousness in engineering is not a thing that just comes to you, it is not something you just "happen" to know. Rather it is the result of an educational process—formal study in the exacting laboratory of test and experience.

The Institute's College of Engineering Sciences offers an extended sequence in advanced mathematics ranging from calculus through differential equations and vector analysis. Similar sequences of advanced courses are available in aerodynamics, thermodynamics and jet propulsion systems, aircraft structures, electronics, nuclear physics and guided missiles. In addition, a limited number of electives are offered in order that students may go more deeply into the subjects in which they are particularly interested.

All subjects concerned directly with aircraft—their design, development, maintenance, procurement—naturally deal intimately with "safety considerations."

"Will it be safe?" is always the first question.

One of the quizzes during the current quarter for the Applied Aerodynamics course contains this question:

"6. An airplane of 11,700 pounds weight having a wing area of 228 square feet (rectangular plan form), a span of 38 feet, air foil section Clark Y, is flying level over the Himalayan mountains at a true airspeed of 250 mph. Instruments read as follows: Altimeter 25,000 feet (with latest altimeter setting of 29.92" Hg.); outside air temperature —47 degrees F.

Determine: 1. Air density. 2. Lift coefficient. 3. Drag coefficient of the wing. 4. Mach number. 5. Reynolds number. 6. Whether it could be safely flown over a peak of 25,000 feet actual elevation. This is the problem not only for an air engineering student but for any pilot—and it comes right down to SAFETY in the long run.

For the present term, the Institute of Technology has assigned four professors to an investigation of the aircraft accident picture and flying safety in all its applications. Their study will of course pay particular heed to design and engineering factors which may have contributed to certain accidents, but factors such as pilot failure will also receive their attention. Results of this work will form the basis for future project studies in safety engineering.

The location and design of flight instruments, controls and emergency exits are frequently under study by Institute faculty and student personnel

and receive equal attention with the more salient safety factors of aerodynamically sound design, structural strength, and perfection in overall engineering.

USAFIT's College of Industrial Administration is designed to fit certain aspects of the management needs of the AF which are today as exacting as those of big business. Along with basic courses in engineering and math, the curriculum includes academic fundamentals for a background in production, procurement, supply and industrial mobilization planning. About one-third of the program deals with basic engineering and science, the balance including such subjects as law, labor relations, war economics, accounting, corporate finance and similar facets of the industrial and engineering administration fields.

The Institute's faculty of 30 is two-thirds civilian. It includes 14 PhD's and represents a wide variety of experience in industry, science and education. Many of the professors joined directly from teaching positions in some of the nation's leading universities. Director of the Institute is Mr. Ezra Kotcher, an Air Materiel Command engineer for over eighteen years. Prior to the war, Mr. Kotcher held the post of senior professor in aeronautics at the Institute's predecessor, the Air Corps Engineering School.

In addition to its resident program at Wright-Patterson, the Institute annually selects officers for assignment to civilian colleges and universities for advanced education in fields that correspond to AF requirements for competently trained officer specialists. At present, some 1200 officers are enrolled in 75 U. S. colleges under this program at both graduate and undergraduate levels.

Training-in-Industry programs, from which officers return to the Air Force with invaluable industrial know-how plus an intimate understanding of problems, techniques, procedures, production methods employed in American enterprise, are also conducted by USAFIT.

Younger officers throughout the Air Force have shown high interest in the Institute's counselling and guidance service. Designed to meet the educational needs of that large group of war-service officers whose formal schooling suffered while their military and combat proficiencies advanced, the educational counselling and guidance program outlines and recommends specific individual programs for all officers who submit requests for evaluation. A thorough study is made of the applicant's educational background, his civilian job experience, his military operational and administratve experience. His entire past is evaluated, and resulting recommendations are made with a view toward establishing for him a foundation from which he may expand professionally.

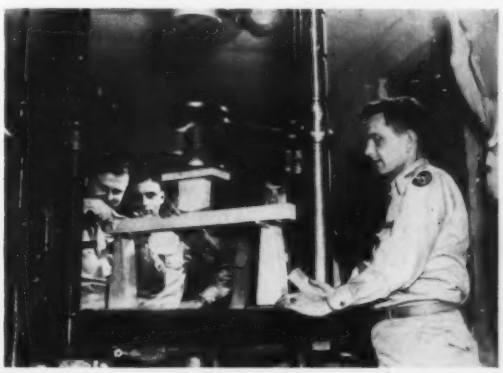
Through this program requests for evaluation are handled quickly and efficiently although the accent remains on *maximum attention to individual needs.* Much of the counselling is done through correspondence with the officer concerned, but in many instances personal consultation has been arranged immediately for those who are able to make direct visits to the Institute at Wright-Patterson.

The widespread realization that present day technological advances will result in weapons and equipment of warfare highly technical in nature has lent impetus to this quest for additional technical education among junior officers. Such continuing advances, coupled with current policies of selective promotion, make it obvious that the officer with a solid educational background has the best chance to advance to a position of high responsibility, all other factors being equal.

The Institute feels, too, that the pilot who knows well the aerodynamic and engineering factors which weigh heavily in the production of his aircraft, is the pilot-executive of the future. Whether flying airplanes or buying airplanes, he will always KNOW where he stands. And his education will have given him built-in safety factors which apply in any assignment.

Maj. Julien Burkness, left, counsellor, outlines a program of off-duty study for an officer who visited the Institute.

Students test strength of materials in laboratory at USAFIT.



ZERO ACCIDENTS

By Capt. John J. McElroy
Flying Safety Officer, 21st Troop Carrier Sq.

With the advent of "Vittles" and its subsequent drain on Air Force transport resources throughout the world, the men of the 21st Troop Carrier Squadron (H) at Harmon Field, Guam, found themselves faced with the task of taking over a portion of the MATS runs west and north of Guam.

The 21st TCS began flying these runs in November of 1948 and since that time has flown a total of 18,911 hours carrying 33,213 passengers and 9,453,901 pounds of mail and cargo a total of 3,316,900 miles with neither a major nor minor accident nor serious incident on a scheduled flight during this period. To put it into commercial parlance this amounts to a potential of 80 million passenger miles.

These runs included scheduled flights to Tokyo, Okinawa, Philippines, Shanghai, Tsingtao, Guadalcanal and Hawaii, plus FEAF flights to Tachikawa, Iwo Jima, and anywhere in the theater deemed necessary by higher headquarters. All routes involved overwater flying.

The record is good, but our pilots would first have you consider our maintenance, personnel, supply, and equipment problems. For instance, the C-54 type aircraft we have been flying are all "D" series and had seen a good bit of service before we acquired them. Our maintenance section has successfully battled through typhoons, supply shortages and unskilled personnel problems. Mechanics have been on a seven day work week. Ingenuity, imagination and superhuman effort on their part has enabled us to get them in the blue when it looked like we just didn't have an aircraft available. They always came through.

Our pilot requirements for checkout have necessarily been high and we run a constant system of route checks for proficiency. Does it pay?—Look at the record: no major nor minor accidents, no locked control takeoffs, head up taxi accidents, collapsed gear, nor locked brakes on the runway.

COMMUNITY PROJECT

THE Colorado state highway patrol in the Denver Area will play an important part in a new system, implemented by Lowry Air Force Base, to locate aircraft in the event of crashes off the base and they will assist crash crews in finding the most direct route to the scene of a crash. Grid maps of the Denver Area will be placed in all Lowry base aircraft, in police cars and in all emergency military vehicles. By joint agreement between Stapleton Airfield, Denver's Municipal Airport, and Lowry Air Force Base, in the event of a crash at Stapleton, the field will notify the Lowry tower. At the same time, emergency vehicles will respond with the Colorado State Highway Patrol, Denver Division, to proceed immediately to the scene of the crash as located on the grids.

The new crash flying maps which cover a 30-mile radius of Lowry have been discussed with all rated personnel at flying safety meetings at Lowry. In addition, Stapleton Airport traffic controllers have been given thorough briefings on their use by officers of the 3415th Technical Training Wing.

In addition to the crash grid map project, newly established flying patterns, coordinated between Lowry Air Force Base and Stapleton Airfield, provide safe and easy flying for incoming and outgoing air traffic at both fields. The various air traffic levels in this area were carefully established by Lowry and Stapleton flying safety officials to set air traffic at safe altitudes. All air traffic is coordinated at the Stapleton control tower from which the control tower at Lowry receives instructions pertaining to incoming and outgoing aircraft. The flying patterns have been prepared in printed form for study by military and civilian pilots in the area.

BAILOUT KIT

"How can ample Arctic survival equipment be provided to a pilot cramped in the small confines of a present-day fighter cockpit?" A new sustenance kit that attaches to an airman's back-style parachute may be the answer from the Air Materiel Command's Aero Medical Laboratory.

The problem boils down to one of bulky equipment vs. limited space. The new kit solves this by doing double duty as a seat for the pilot while he is in flight and by meeting three crucial requirements—completeness, compactness and comfort.

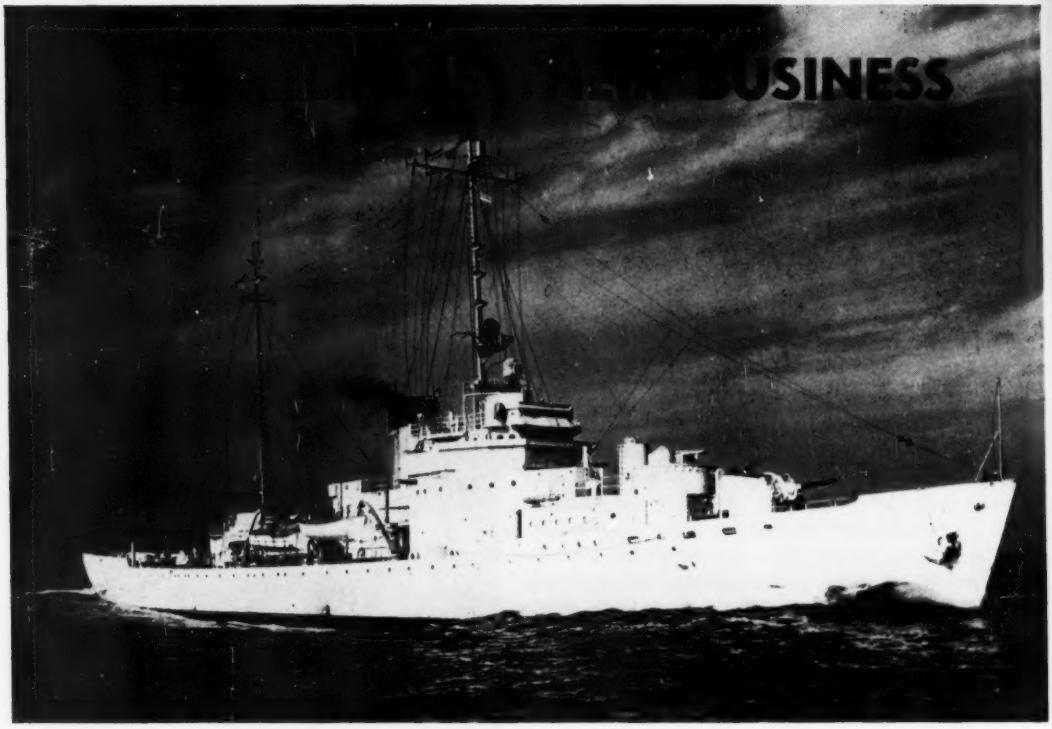
Complete in this instance means everything that would be required to keep a stranded airman alive in the Arctic for several days. A total of 22 different items are packed into the kit. Perhaps the most important is itself a recent development of the Aero Medical Laboratory—a vacuum packed sleeping bag which keeps its occupant warm even if the thermometer skids to —40° F. Thanks to vacuum packing, the sleeping bag occupies approximately 40 per cent less space than its hand-rolled counterparts, leaving precious space for other survival equipment.

Also included are such items as a canned-heat cook stove, a .22 caliber revolver, mittens, ski goggles, signaling mirror and flares, waterproof matches, wool socks, compass, water container, pocket knife, survival manual, and food packets.

The kit itself is a zippered container which is semi-permanently attached to the seat sling of the parachute harness. One side of it is contoured and covered with a foam rubber padding to form a comfortable seat for the pilot during flight. In the event of bailout, the kit is part and parcel of the parachute and there is no danger that it will be separated in descent.

The whole kit weighs only 24 pounds—and that includes 10 days of food rations. Now undergoing field tests in Alaska, it may soon be issued to all USAF pilots assigned to cold climates.

The same seat-type container also will be used for other sustenance kits designed for land survival in warmer climates.



By CAPT. HERBERT L. BALLARD, AIR RESCUE SERVICE

NERVE center of all rescue operations for the entire Atlantic area from Greenland to Puerto Rico and from the East Coast to Europe is an office in a New York City skyscraper.

Here Coast Guard officers are on duty 24 hours a day every day of the year in the Coordination Center of the Third Coast Guard District, ready to direct rescue operations in any emergency in the air or on the sea.

Here is how the Coordination Center functions: There are direct communications at the center with Flight Service, Air Rescue Service, CAA, Coast Guard Air Stations, Navy Headquarters at Third Naval District, Aircraft Warning and Control Service, and Coast Guard Lifeboat Stations. There is also a world-wide net of teletype communications that will transmit information through various agencies to almost any part of the world. Even the teletype circuits of the New York State Police are at the disposal of the search and rescue center. In the event of an emergency any and all of these facilities may be and are used.

The CAA Air Traffic Control at LaGuardia Field has both a domestic control unit and an ocean control unit. Domestic emergencies are defined as those occurring within the continental limits of the United States and 50 miles out to sea. Air emergencies occurring in that area are handled by Domestic Control while all oceanic emergencies are handled by Ocean Control. All known emergencies and overdues are transmitted to the Coast Guard Coordination Center and are passed on to the unit nearest the zone of emergency.

The coordination center has authority to direct that a search be made and to designate the controlling agency. The Air Rescue Service unit in the field nearest the supposed position of the lost aircraft assumes control of the search. Through the Center the unit which has assumed control of the search may request any assistance needed. Coast Guard aircraft are frequently used and when a Coast Guard station is the closest agency it gets the job. The Center then acts only as a communications liaison. After search has begun reports are sent to the center until the search is ended. The above procedure is, of course, for a domestic case.

When an emergency over the ocean occurs, CAA Ocean Control declares the emergency, passing along

the flight plan the same as for the domestic alert, giving the last position and the type of emergency. In the event an airplane is overdue in reporting, the Coast Guard Ocean Weather ships at sea are alerted to stand by on the last known radio frequency the aircraft worked. Also the Search and Rescue units at the departure point and point of destination are alerted. In the event of mechanical failure, escort by an Air Rescue Service craft may be requested by the plane commander. Then planes from the nearest unit are dispatched to intercept the distressed plane and escort it to the nearest landing field. In a matter of a few minutes the center can get word to Search and Rescue units at Bermuda, Azores, Greenland or any other unit involved.

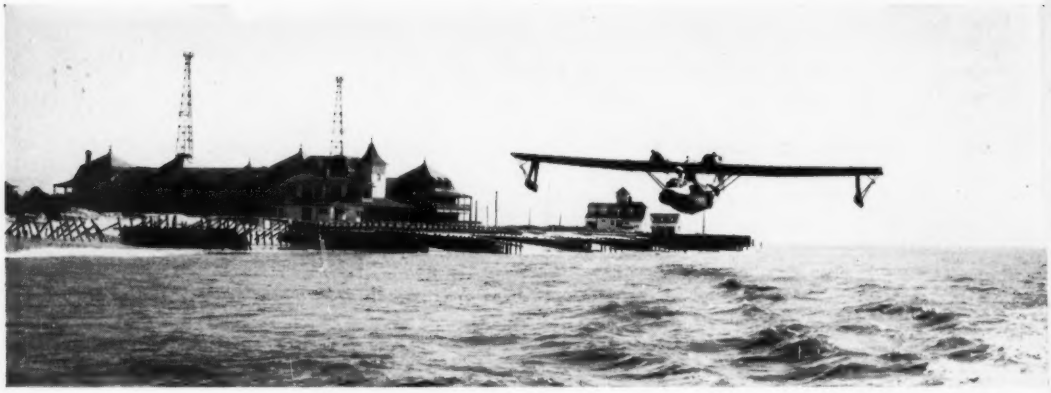
Some time ago a C-54 radioed that Number 4 prop was feathered and a second engine was about to go out. This particular flight was between Lagens, Azores and Kindley AFB, Bermuda. Escort was requested. A message was dispatched to both Lagens and Kindley directing that Kindley furnish the escort, since they were nearest and since the plane was flying to that station. Shortly after the first message was received from CAA Ocean Control, word was received that Kindley had a B-17 with dropable lifeboat installed in the air and a second plane was warming up and ready. The distressed aircraft was intercepted and escorted to a safe landing at Kindley.

In the case of an aircraft overdue past the stated fuel range, the Coast Guard sends out a message alerting all surface craft within the area to be on the lookout for flares, life rafts or wreckage. The center knows the daily position of every large surface ship in the Atlantic. A search in which the Air Force, Coast Guard, Navy and Merchant Marine will be involved is begun.

Should an emergency arise involving a surface vessel that requires air search, the Coast Guard may require additional aircraft. If so, Air Force units are requested to furnish the necessary aircraft. In either case cited above the Search and Rescue facilities of the RCAF may be called upon. There is a joint agreement that we will furnish aid to the RCAF and they to us.

It is a safe bet to say that only one out of 10 so-called emergencies is an actual emergency, but the Coordination Center must handle all of them.

Take the case of an Air Force pilot who took off from Las Vegas, Nevada for Grenier AFB, New Hampshire. No position reports were made along the entire route and he became overdue. A com-

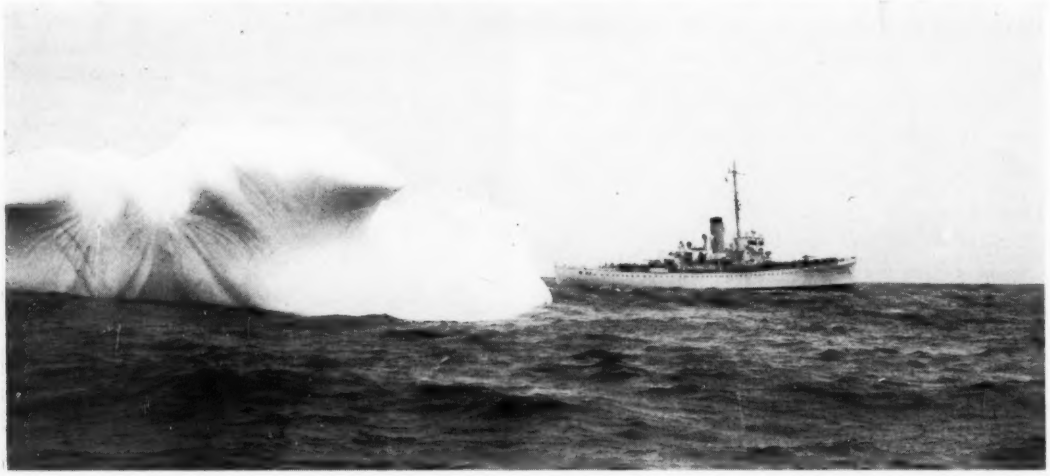


munications search was made. Since the alert had come in just after dark, a visual search could not be started until morning. It was impossible to determine where this man might be because of the great distance from the point of departure to destination, so every Search and Rescue unit from the West Coast to the East Coast was alerted. It would have taken virtually every airplane assigned to these units and then some to make a visual search of this route had it come to that. Just before daylight word was received that the pilot had landed at Logan Airport, Boston, Massachusetts. The pilot had not closed his flight plan when he landed at Logan.

Searching for lost or overdue aircraft is not the only service rendered by this organization, however. Search and Rescue aircraft have been called upon to accomplish many other missions. One pilot was dispatched to drop a load of diapers to distressed infants aboard the Coast Guard cutter Bibb at the time the survivors were taken from the Bermuda Sky Queen. Numerous times medicine dropped to ocean vessels has saved the lives of ill persons aboard. Parts for repair were dropped to an Army transport loaded with personnel so the ship could continue on her way. That saved waiting four days for another surface vessel to arrive with spare parts. The assignment of these tasks was handled through the Coordination Center.

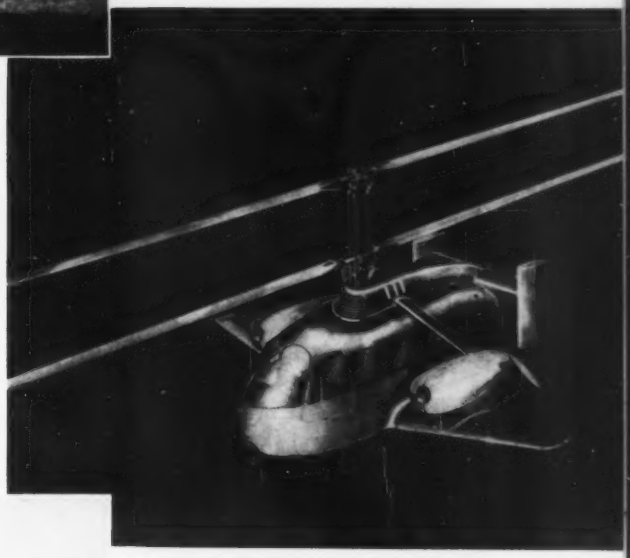
The Air Sea Rescue Coordination Center at New York, like a comparable center at San Francisco, is set up to help pilots and aircraft in distress. The best way a pilot can help make the job of the people in the center more effective and a whole lot easier is by staying out of trouble—the kind where the party of the first part fails to do his part.

It is comforting for air crews to know that vessels such as the fast Coast Guard cutter are at sea to give assistance to airplanes as well as ships in distress.



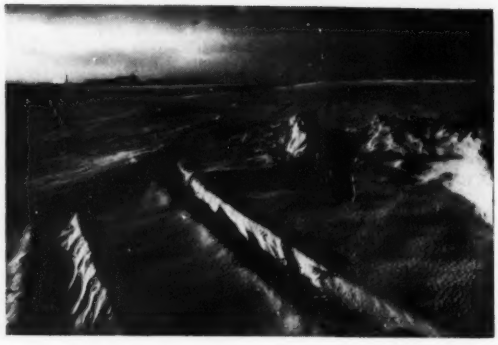
CONVERTOPLANE

THE revolutionary craft pictured here is called a "Convertoplane." It takes off, hovers and lands like any other helicopter, but once in the air it cruises at 150 miles per hour, nearly twice as fast as any helicopter now in use by the Air Force. Air Force pilots who have flown the Model 7, Helidyne, as the plane is known, are enthusiastic about its performance. The pictures above and below show the prototype in flight with the conventional propellers rotating and stationary. The picture below shows the plane as the



final production model will appear. The plane will be amphibious, the wing functioning as a sponson. The conventional props are declutched during helicopter operations and engaged for forward flight. The plane will auto-rotate and will fly on one engine as a helicopter. In forward flight the wing will provide the major portion of lift and the speed limit is reached when drag equals thrust as in all conventional airplanes and not be limited by blade stall as in the case with other helicopters which depend on the rotors for lift in forward flight.

SPRING FLY



ALTHOUGH millions of dollars have been spent lengthening runways, clearing approaches, moving wires and chopping down trees so that pilots can have an unobstructed view as they try to land, some pilots just can't seem to make it to the runway.

Take the case of the pilot who put the dents in the dike shown in the first picture. He was flying a C-54 with a load of passengers aboard. Long before he arrived over his destination he had been advised that heavy gusts would make a landing over wires and a dike at his destination difficult. Upon arrival, the pilot elected to make a landing, proceeded to fly the final and collided with the dike.

Another dike denter flew a C-46 into the hill shown in picture number two. The pilot was getting a checkout. His instructor pilot had beaucoup hours in the Commando. All the way down the final, according to the accident report, both pilots felt the landing was in the bag. There was a slight difference of opinion as far as the crew chief was concerned. He said that after one look at the approaching ground he decided to snuggle up behind a bulkhead. That's where he was when the C-46 started to disassemble. One might be inclined to wonder why the instructor, when he failed to do anything about the landing, did not ask the crew chief to make room for one more behind the bulkhead.

And now to switch to the winter scene. An F-80 pilot landed a hundred yards short of the runway shown in picture number three. The F-80 received major damage to the right gear assembly after hitting that snow bank. There is no doubt that the F-80 pilot wanted to touch down right on the end of the snow-covered runway because he figured braking would be bad, and no one can blame him for that. But when he had the opportunity to see several other F-80's land without any trouble, he shouldn't have tried to cut it so close.

Then there are the fencebusters. The F-84 pilot who tore up the fence shown in picture number

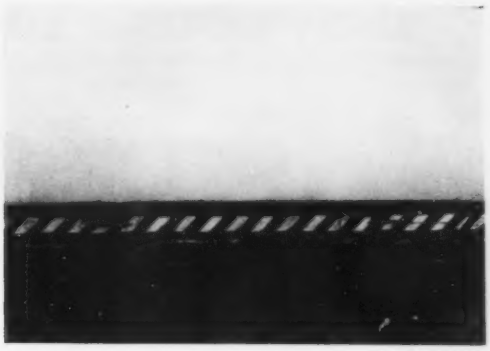
four has since been informed that the only purpose of the striped fence was to show him and his winged brothers that there is an incline up to the runway. The F-84 pilot tried to set it down in the first few feet. He did—on the first few feet of the incline.

That's not a smudge pot pictured in number five photo. It is a picture of what happens when airplanes spring big fuel leaks after hard landings on rough ground and then slide up onto nice concrete runways. This was the case of another pilot who had his landing in the satchel. He cut his power off about a hundred yards off the end of the runway. About 99 yards later he was turning furrows in the earth.

And that's not a shallow grave in picture number six. The pilot who dug it out did so with the left wheel of the C-47 he was flying. He probably wishes it was deeper, so that he could pull it in over his head. He also tried to touch the very end of the runway and landed short. His plane stalled out and hit hard enough to knock the left wheel off the airplane. With over 7000 feet of runway on which to land everyone should agree that he could have put that one down on the runway and had room to spare.

The pilot of the F-80 with the bent strut door pictured in photo number seven learned his lesson the hard way too. After peeling off for landing, he reefed the F-80 in so tight that he lost the airspeed necessary to sustain that type plane long enough to reach the runway.

While none of the pilots involved received more than a few scratches, five of these seven airplanes will never fly again. The other two received major damage. There was no reason whatsoever for these seven accidents. They were caused by proud people —pilots who feel that their ability is measured in feet from the end of the runway. We agree, but it should be measured in feet after passing over the end of the runway.



STATIC

EVERYONE who has flown weather is familiar with the phenomenon called static in the form of radio interference; however, only in recent years have engineers become well acquainted with its exact cause and what can be done to eliminate it.

An airplane flying through an area of precipitation builds up an electrical potential as a result of separation of the drops of precipitation either from striking the airplane or colliding with one another. When the potential of the aircraft is high enough to break down the surrounding air the charge will be dissipated from sharp edges and projecting parts of the airframe in the form of corona or glow discharge.

There has been considerable confusion on the part of some pilots as to the difference between lightning and static discharges. Actually, their characteristics are quite different. The static discharge current from an aircraft never exceeds a few milliamperes, while in lightning discharges, peak currents of 20,000 ampere are not infrequent. Thus in the discharge of precipitation-static there will be no magnetization of the airframe and there will never be sufficient heat to cause the loud explosion which characterizes lightning strikes. Even though corona discharge may continue for hours it will not result in holes being burnt through the skin of the metal at point of discharge. At the most only small pitted marks will be formed at the points of discharge.

Of course the most annoying result of precipitation static is the interference with radio reception caused by the gradual leakage into the surrounding air of the accumulated static charge. In the early days of static research it was thought that interference was caused exclusively by water drops or ice crystals impinging on the aerials. Experiments with shielded aerials disproved this theory and showed that the interference was due to the corona or brush discharge which took place from any sharp edges or projecting points on the aircraft structure such as propeller tips, wing tips, guns, etc. Static interference varies from a harsh grating noise to a shrill, high-pitched shriek. This variation is due to the geometry of the point of discharge.

Planes may become either positively or negatively charged. The ratio of charging varies directly as the fourth power of the speed of the plane.

Pilots whose planes have been struck by lightning in flight emphasize that static interference was heard prior to the lightning flash and they reported in many instances that a glow discharge was observed from sharp edges, particularly the propeller tips. Pilots also reported that a glow was occasionally seen around surfaces such as windshields prior to a lightning strike. In some instances this glow was of very brief duration and sufficiently brilliant to blind the pilot momentarily. Such a condition could be confused with a minor lightning strike.

Much of the radio interference caused by static has been eliminated by the use of dischargers of various types, the most common of which is the wick discharger. These dischargers are the plastic covered wires attached to the trailing edge of the wingtips and sometimes to the tail section of planes. They consist of cotton cord about 12 inches long, impregnated with a hygroscopic fluid to increase the conductivity. The wick is covered with a plastic sleeve except for about one-half at the end.

These dischargers permit the dissipation of charge at a potential lower than that necessary for corona from the structure, but they do not in anyway minimize the possibility of a lightning strike on the plane. Some cases of lightning strikes to planes in flight have been reported where the static dischargers at the wing tips were burnt off.

It is sound practice when you encounter precipitation static or corona discharge while flying at night or in very dark clouds to turn all cockpit lights on bright.

A LOUD SCRAPING NOISE

UNINTENTIONAL wheels-up landings are BAD, but pulling up the gear while on the ground is stupid. Shown here are a few examples of what not to do in order that you may look your C.O. in the eye without flinching.

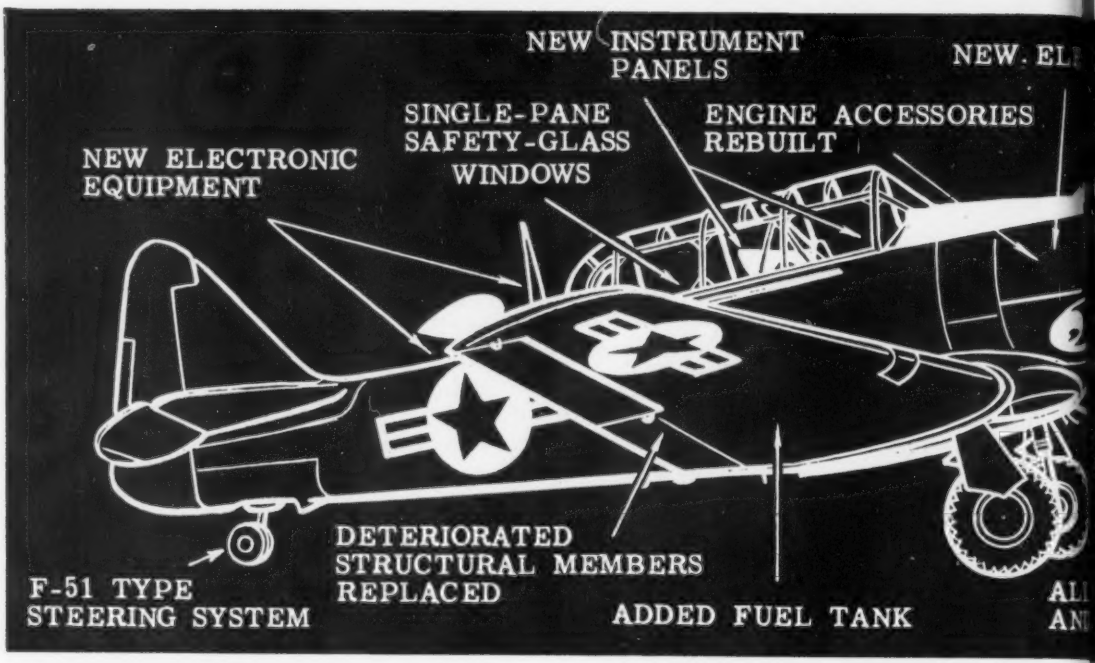
A few timely tips are added for your further edification:

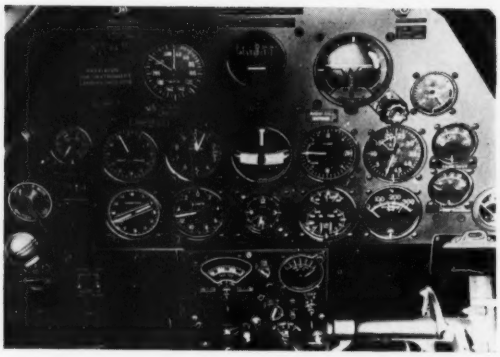
(1) Do not attempt to raise flaps during the landing roll. Wait until the plane has turned off the active runway.

(2) Then, look at the flap control lever before moving it.

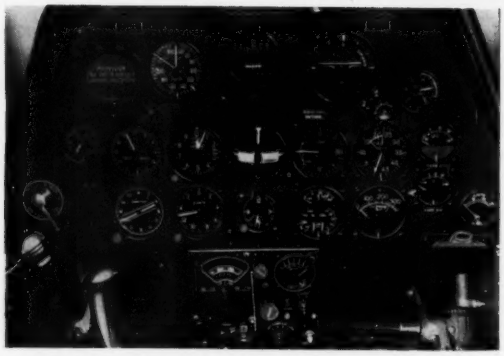
(3) On takeoff retract the landing gear after the airplane is airborne, insuring that sufficient speed and altitude have been attained so that the plane will not settle back on the runway.

During touch-and-go landings in some types of planes it may be necessary to retract flaps before becoming airborne on subsequent takeoffs. Under some circumstances due to weather, field conditions and in certain types of aircraft flaps should be retracted soon after landing. Except for these, the above precautions should be followed.

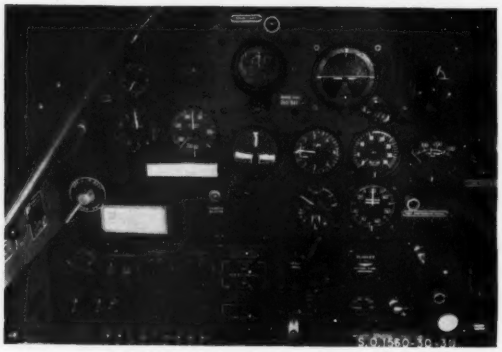




Front cockpit panel T-6G above. Below is same view in T-6D.



Rear panel in T-6G above has more instruments than in T-6D.



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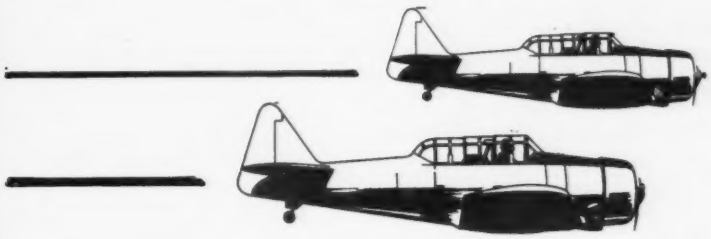
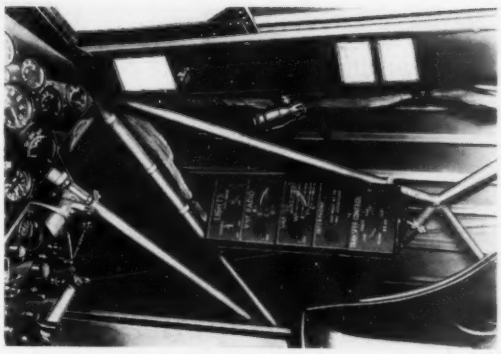
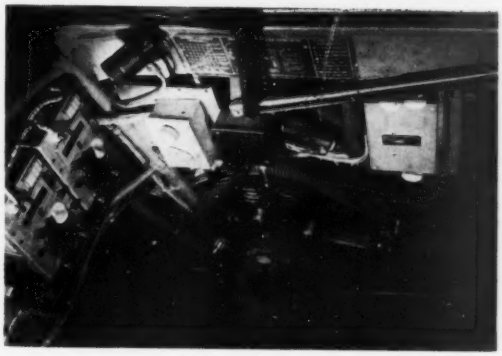


THE prototype of the famous T-6 trainer series, the NA-16 flew for the first time in 1934. It won Air Force approval and 42 trainers, designated BT-9, were ordered.

Since then, outgrowths of this plane became standard trainers for the USAF, USN, RAF, RCAF, RAAF and 33 other allied nations. USAF cadets will continue to fly the T-6, although with many improvements. An added safety factor in the T-6G is that the rear seat has been raised giving the instructor better forward visibility. Engine and external configuration remain the same, but major changes are made in cockpit arrangement, instruments and radios.

Instrument panels in front and rear cockpits of the T-6G are identical and interchangeable, as recommended by flight instructors. Total fuel capacity has been increased to 145 gallons, assuring greater trainer utilization time and a range of 1,000 miles. Electronic equipment includes a VHF command set, range receiver, marker beacon receiver, interphone, radio compass and instrument landing system. Engine, landing gear, wing flap, and carburetor air temperature controls are relocated or redesigned to afford easier operation, and all electrical and radio controls are grouped on right console in either cockpit. The hydraulic power push button has been removed, actuation being fully automatic upon operation of either the landing gear or flap control.





Radio controls, light switches in T-6G above. Below, T-6D.

MEDICAL SAFETY

DON'T BE A DOPE

Confucius said, "He who treats himself has a fool for a doctor." That idea is magnified tenfold when an aircrew member takes it upon himself to be both birdman and physician. The effect of self treatment upon physical and mental processes is such as to cause flying hazards.

The history of medicine has been marked by steady progression in the treatment of diseases and the preservation of health. During recent decades, the normal life expectancy of an individual has been increased by more than twenty years. Many discoveries have been made,—discoveries which have led to improvement of general health.

For example, the story of sulfanomides and of penicillin is known to almost everyone. The amazing results achieved by insulin in diabetes and vitamin therapy in the deficiency diseases are also common knowledge. And many know the story of the development of abdominal surgery in the late 1800's and of chest and brain surgery in the 1900's. All these wonders of medicine and many more are available to you. However, their use requires a little common sense. Education in medicine has brought its share of thoughtlessness and recklessness in the use of many stimulants and drugs easily available from the corner drugstore.

Probably the greatest offenders of these easy-to-obtain items are alcohol, nicotine, benzedrine, caffeine, sulfa drugs and various aspirin compounds. All of these, if given in small enough quantities over short periods of time, are entirely harmless. It is only when used in excess or for prolonged intervals that dire effects are brought about in the body.

Alcohol as an astringent and antiseptic reduces body temperature by its evaporation. Internally, it is a narcotic widely used as a stimulant but which may do more harm than good. Usually the stimulation is temporary and is followed inevitably by various stages of mental depression, stupor, and occasionally coma. The effect upon vision is extreme, as evidenced by blurring, spots before the eyes, and double images.

Caffeine is a very effective stimulant found in appreciable quantities in coffee, tea, and cola beverages. It has an important use in medicine as a respiratory, heart and physic stimulant and as such has saved many lives. However, excessive and continued use leaves marked characteristics upon the nervous system and blood vessels.

Benzedrine sulfate is another stimulating drug, extremely potent, now famous among students and aviators for its ability to delay the desire for sleep. It should be used only on the advice of your flight surgeon who will prescribe the correct dosage.

Nicotine probably has the widest usage of the entire group because of the worldwide adoption of smoking as a habit. Suffice to say, that when the intake of tobacco smoke is excessive, the amount of nicotine absorbed by the body may be large enough to cause definite changes in one's nervous and circulatory system. Extreme nervousness, visual disturbances and insomnia may result.

Self-medication with the many sulfa drugs now offered for sale is increasing day by day and the complications due to incorrect dosage of sulfanomides become alarmingly severe and occasionally fatal. In addition to nausea, vomiting and double vision, they may cause skin rashes and crystallization in the kidneys to such an extent as to obstruct the flow of urine temporarily or permanently. Indiscriminate and repeated use of sulfas for minor colds and sore throats results in susceptability to pneumonia. This will result in the sulfa drug being powerless to combat the germs now well accustomed to the drug. USAF Regulations require that pilots be grounded if taking sulfa drugs in amounts exceeding one gram a day.

Aspirin and allied compounds in repeated or over-dosages have been shown to cause "oxygen want" at high altitudes in a manner similar to alcohol. Due to temporary tissue poisoning, the oxygen floating in the red blood cells is unable to enter the already starving tissue cells. The result is a definite lowering of the pilot's ceiling and extreme susceptibility to frost bite.

The human body is an infinitely more complex mechanism than is the airplane. The tools for its servicing and repair are available. Properly used, they will be of tremendous value in the preservation of health and the treatment of illness. Improperly used they may cause irreparable damage. Don't self-medicate!

WELL DONE

To

CAPT. ROBERT R. FREDETTE
RANDOLPH AIR FORCE BASE

This month's Well Done goes to Capt. Robert R. Fredette who is stationed at Randolph AFB. And he gets two clusters as well. Captain Fredette is a basic instructor who had more trouble in one day than most pilots have in five years.

His troubles started while he was flying dual with a cadet. Fredette discovered smoke and fire coming from some electrical wiring. He promptly cut off the battery disconnect switches and generator switch, called Randolph control and told them of his trouble and headed off for home where he made a landing with no further damage to the T-6.

A check of the T-6 revealed a malfunction in the generator which could have caused a serious fire and made a bailout necessary had it not been for the quick thinking and action on Captain Fredette's part.

With several hours remaining in the flying period, Fredette requested another T-6 and told one of his other students to get a chute. The student climbed the T-6 out of traffic and proceeded to the area for practice air work.

After an hour or so, the student let down and entered traffic to practice landings. The student went through the "before landing check" and turned on the downwind leg.

Captain Fredette supervised the completion of the "before landing check" and as the turn onto final was completed, he reviewed the student's final approach recheck. The recheck revealed that the gear was not fully extended although the indicators were in the full down position.

Captain Fredette attempted to actuate the gear handle from the rear cockpit and found that he could move it to the "UP" position. This proved a definite malfunction of the control system so Fredette took over and made an emergency go-around to investigate the cause of the trouble.

During the go-around it was found that the gear handle had vibrated from the DOWN to the UP position. Since the failure of the spring-actuated gear selection positive locking device was causing his trouble, Captain Fredette dropped the gear and held the handle in the DOWN position manually while the student successfully landed the airplane.

Possibly the feeling that nothing else could happen that day and the fact that he had one more cadet and an hour to go before quitting time prompted Captain Fredette to request another T-6.

Twenty-five minutes later he was back on the ramp. After a normal landing, Fredette noticed that a strut was low. He got out and looked the gear over. The left strut was cracked and had he taken off rather than checked the strut, the wheel, strut and all would have probably dropped off.

Such a display of outstanding pilot ability and knowledge of operational techniques reflects only the highest credit upon Captain Fredette, his organization and the Air Force.

THE ICE CAP AND ARCTIC WEATHER

By MAJOR A. R. GORDON, JR. and CAPT. W. C. WOODWORTH

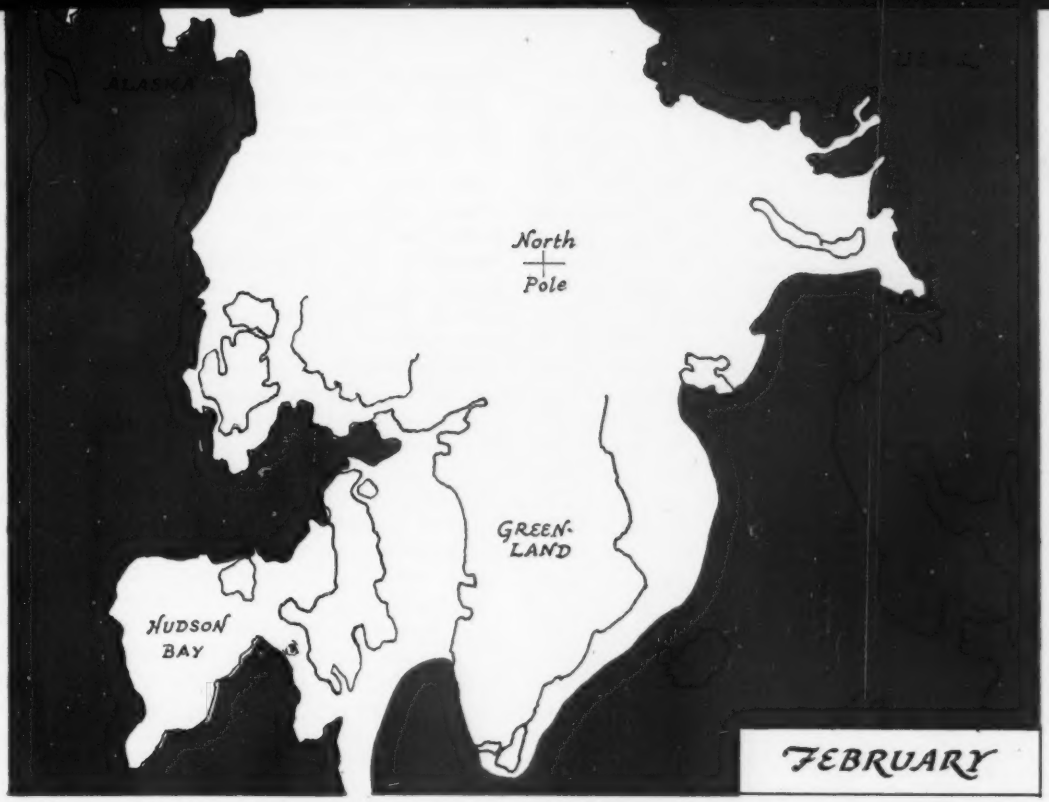
ALTHOUGH weather forecasters are aware of the general effects of snow and ice conditions upon the weather, progress has barely begun toward determining their relationship with weather conditions as portrayed on weather maps. The Russians have taken the lead in the study of snow and ice and their affect on weather. Some recent Russian findings have been used in preparing this article.

One of the most easily perceived effects of snow and ice is that upon temperature. Extensive snow and ice covered areas are well known as potential source regions of cold air. An interesting example of this effect in the lower atmosphere can be seen in conditions over the Arctic Ocean. There the temperature of the air near the ice surface is dependent primarily upon the temperature which the ice surface itself attains. The ice temperature depends upon three factors: (1) loss or gain of heat by radiation, (2) transport of heat from the atmosphere above the ice, and (3) transport of heat from the warm water beneath the ice.

Over the Arctic Ocean the air temperature at the ice surface deviates only slightly from the temperature characteristic of the season. For example, from June through August, the surface air temperatures deviate no more than two degrees Centigrade on either side of zero, since the ice never melts completely. Likewise winter temperatures, on the average, are about constant at a value somewhat below minus 20 degrees Centigrade. On the other hand, over extensive land areas in the Arctic the snow largely disappears in the summer and thus, away from immediate coastal areas, summer air temperatures rise considerably above freezing. Winter temperatures over Arctic land areas drop considerably lower than over the Arctic Ocean.

During the greater part of the year, from about October through April, the Arctic Ocean is covered by a thin layer of cold air several hundred meters thick above which the air is warmer. By way of contrast are the more extreme winter conditions at an inland arctic station such as Fairbanks, interior of Alaska.

The absolute minimum temperature possible on the polar ice pack must be reached in clear, calm weather when the loss of heat by radiation is at a maximum and the amount of heat conducted through the ice from the water below is at a minimum. Sverdrup has computed this value at about minus 50 degrees Centigrade. The absolute minimum observed by the exploration ship "Maud" during more than two years of drifting in the Arctic Ocean was minus 43.5 degrees Centigrade. The lowest temperature officially observed on the surface on the earth is minus 69.8 degrees C.


North Pole
GREEN-LAND
HUDSON BAY
FEBRUARY

AUGUST
North Pole
GREEN-LAND

at Verkhoyansk, Siberia in February 1892.

An excellent example of the change in the properties of large air masses is found in studying the soundings in the Hudson Bay region. In fall and winter, up until about January, continental polar air passing over the bay from the northwest picks up heat and moisture in the lower layers. By the time the air reaches the eastern shore of the bay, it is accompanied by considerable cloudiness and copious snowfall. Records from Port Harrison, on the eastern shore of Hudson Bay at about 58 degrees north latitude, show that after January the amount of cloudiness and snowfall both diminish markedly. The cause of this change has been rightly attributed to the bay freezing over almost completely. Incidentally, it has been only within the past five years that we have come to realize that Hudson Bay does freeze over completely during winter except for some leads.

The effect of the ice fields and open water on weather conditions should be noted because of its practical applications. When large ice fields are interrupted occasionally by breaks or leads in the ice—and these occur even in the middle of winter in the center of the polar ice pack—it is easy to see that a source of both moisture and heat is made available to the relatively dry, cold air mass just above the ice. Fog and low stratus clouds increase sharply in areas where these leads occur. Knowledge of such leads, therefore, assumes considerable importance for the meteorologist who must forecast for aircraft landings at coastal stations or aircraft landings on the sea ice itself.

Large areas of pack ice, such as those that occur off the east Greenland coast, have a stabilizing effect upon the air in the lower layers and may assist in the formation of heavy fog under otherwise slightly unstable air mass conditions. Forecasters should know where these fields are in relation to their own areas of forecast responsibility and to be aware of any changes in movement.

Surface snow has a profound effect on visibility in arctic areas. The arctic "white-out" is one well known effect. Another effect is noted when loose, granular snow, such as occurs at Churchill, Canada, is picked up by winds, polluting the lower 1000-2000 feet of air and closing airfields for four or five days in a row under otherwise clear sky conditions. In other areas where the snow is porous and the weather calm, it tends to prevent fog formation because of the dry snow's ability to absorb moisture. Vapor pressure over an expanse of snow is always less than that over fog droplets, providing the temperature of the latter is less than the temperature of the snow. This is an argument for taking regular measurements of the actual temperature of the snow surface.

The effect of surface ice upon visibility is probably less pronounced than snow, though it has been stated that ice occurring in patches in water areas does tend to increase the prospects of fog. Breaks in the ice cover will assist in the formation of steam fog at very low air temperatures. Large breaks or leads in the ice will contribute to persistent fogs when air temperature exceeds water temperature. Icebergs are often associated with blankets of fog, but usually this type of fog is caused by the cold water currents in which the icebergs are floating.

In considering the effect of snow and ice conditions on cloud cover, it is sufficient to note the general distribution of ice cover in the arctic in both summer and winter. (See maps). In summer, cloudiness increases largely because of the large increase in source area for moisture. It should also be noted that even in the area of "permanent" ice in the Arctic Ocean very large breaks and open water areas occur. Furthermore, sea ice in melting from the top forms numerous puddles of fresh water on the ice surface and this water area increases the availability of moisture to the atmosphere.

It should be evident now that the presence and concentrations of surface snow and ice must be determined if the aforementioned weather phenomena are to be forecast accurately along routes or at specific terminals. It will be apparent that these weather phenomena, which are themselves affected by snow and ice, in turn have an effect on snow and ice conditions and a repeating cycle is set up.

The amount of cloudiness has a profound effect upon the rate at which an ice field disintegrates. Other conditions being equal, puddles of melted water will form with much greater rapidity on an ice surface under a clear sky than under a cloudy one. As soon as puddles form they act as accumulators of solar energy hastening the destruction of the ice. On the other hand, in early winter or late fall, the formation and growth of ice may be noticeably retarded by the occurrence of considerable low cloudiness.

The passage of cyclonic storms in the Arctic may change both the ice and snow fields. With regard to ice, the effect of a rather intense pressure system passing is to compress the ice in certain areas, sometimes to the point of heavy hummocking, and to thin out the ice in other sectors. The

Russians have worked out diagrams to show this effect of passing lows on ice fields. It may be possible to plot storm paths across the Arctic Ocean by the marks made in the ice, particularly with reference to hummocking.

Wind, as a modifier of snow conditions, causes packing, drifting and melting, all dependent upon the type of wind. Foehn winds are particularly effective in modifying snow conditions in certain fjords of Greenland. Generally, these winds, warmed dynamically and dry, are helpful in bringing improved weather conditions in the area they strike. On permanent or semi-permanent snow fields an occurrence of snow called "sastrugi" is a result of the general wind flow. Sastrugi, incidentally, are a series of near parallel, hardened snow ridges over a wide area, carved by the pattern of the normal flow of wind. The Greenland Ice Cap has a number of areas showing such wind carvings. Eskimos and explorers allegedly have used sastrugi formations to assist in navigating in the far north. However, there appears to be some controversy among authorities as to how sastrugi line up in relation to wind direction.

The growth of ice is vitally affected by the snow covering it. A thick layer of snow on an ice surface insulates the underlying material against heat loss to the atmosphere and slows down the freezing process. Tides also have an effect on ice fields similar to that of winds. Assuming that the tide moves as a progressive wave, there is a zone of convergence where the ice concentration is increased just ahead of the wave's crest, i.e., at high tide. Just following the crest of the wave there is a zone of divergence in which the ice concentration is reduced. The Russians claim to have put this phenomena to practical use in navigating certain areas so that the ship's positions coincide with the region where the ice is thinned out. The effect of tides in changing the water level is a predominant factor in determining the character of shore-fast ice.

The art of forecasting occurrences, depths, and other properties of ice and snow in the Arctic is still in an embryonic state. The Russians have done a noticeable amount of surface ice forecasting for both fresh and salt water ice, particularly at Archangel for use in planning railway and ice tractor crossings. Forecasting the occurrence of falling snow is an everyday procedure in northern latitudes but we still have much to learn concerning the physical changes that take place in snow after it has fallen.

Forecasting break-up times for ice on the northern lakes and rivers is a challenge to any meteorologist or geophysicist. On the Tanana River in Alaska, a fortune awaits the lucky forecaster who calls the exact minute the river ice begins to move. In many other cases such break-up forecasts of river and lake conditions have high economic value. The flood forecaster must be well aware of the time of break-up if he is to perform his functions properly and issue the necessary prompt warnings.

A group of AWS weather observers taking ice observations in the eastern Canada-Greenland area where a program of ice observation has been in progress since 1943. New codes and procedures for snow and ice observing have recently been developed and, when implemented, should result in more comprehensive data for use of weather forecasters.

It should be evident by this time that there is a strong requirement for a concerted program of snow and ice observation and analysis. The Air Weather Service and the Navy Hydrographic Office are particularly aware of this and have set up a cooperative snow and ice observing program, laying the foundations for operational forecasting of snow and ice (particularly the latter) in the Arctic.

Regular snow and ice observations will be considered a routine phase of the weather observer's duties in all Air Weather Service stations in the Arctic. Observations from reconnaissance and other aircraft are being collected and studied. Data collecting, however, is only the first step in the proposed ice and snow program. A more difficult job of evaluating the data in the light of all possibly applicable geophysical theories will then be necessary to establish new relationships and concepts which will eventually lead to techniques for forecasting the mutual effects of snow and ice conditions and weather on one another.

MINIMAL FLIGHT PATHS

By MAJOR DONALD G. WILLIAMS, HEADQUARTERS, AIR WEATHER SERVICE

WHEN "he was comin' downgrade makin' 90 miles an hour," Casey Jones was trying to beat the schedule and preserve the trainman's pride in the time-table. Today, Air Force pilots of the Military Air Transport Service scheduled trans-oceanic flights are also trying in a somewhat safer manner to beat their schedules by means of Single Drift Correction and Minimal Flight Planning.

The single drift correction flight involves, as implied, only a single adjustment from the great circle course, covering the entire flight; minimal flight planning is used when it is apparent that deviating from the single correction course will result in a still greater saving of time. While the two techniques have this difference in application, they are closely related and are generally referred to as "Minimal Flight."

Last spring, two MATS C-54's departed at the same time from Azores for Newfoundland, a distance of 1400 miles. One plane flew the shortest distance, or great circle course, in nine hours and 26 minutes. The other plane, utilizing minimal flight techniques completed the flight in seven hours and 48 minutes, saving one hour and 38 minutes. (Chart)

Later, two C-54's departed Newfoundland for the Azores. The first plane flew the great circle course. The second plane, using a minimal flight plan, deviated from the great circle course 120 miles at one point, yet landed at Azores 61 minutes ahead of the first plane.

MATS recently established a regular non-stop flight schedule from Westover, Massachusetts, to Frankfurt, Germany, a distance of approximately 3900 statute miles. This flight, possible only through the use of minimal flight techniques, is believed to be the longest *scheduled* non-stop flight in existence today. The start of this new schedule marked the first MATS non-stop flight from US to Germany, and recorded the shortest time ever reported for a flight of this length. The minimal flight techniques saved over one and one half hours of flight time. The second flight proved even more successful, resulting in a saving of almost two hours over the great circle course. (Chart)

Minimal flight is a new and refined version of pressure-pattern flying devised by the Air Weather Service. The system enables pilots on long range flights to utilize the wind-flow pattern to the maximum, taking all possible advantage of tailwinds near the flight course and avoiding headwinds by deviations from the direct course. Minimal flights often exceed the straight line or "great circle" distance by many miles, but because of the resultant increase in effective ground speed, produce a considerable saving in flight time. These flights are proving daily that insofar as flight time is concerned, a straight line is not always the shortest way between two points.

MATS planes have conducted experimental and research flights for the Air Weather Service during the past year over the Pacific and North Atlantic oceans. The results have been so successful that all regularly scheduled MATS trans-Atlantic flights presently utilize minimal flight procedures.

Means of accumulating weather data, and determining the location of pressure areas and jet wind streams are many—radio reports from Naval and merchant ships at sea, in-flight reports from military and commercial aircraft, reports from Coast Guard stations and from shore and inland weather stations. The AWS gathers all available information, analyzes, evaluates and plots it, then utilizes this information in preparing forecasts for flight planning.

The minimal flight technique is based on the theory that the general wind circulation is determined by pressure distribution in the atmosphere. This pressure distribution is measurable at strategically located weather stations and consequently wind-flow charts may be prepared. With a calculated choice of flight routes to take maximum advantage of the wind-flow pattern, flight time may be considerably reduced. In addition, fuel consumption is decreased and wear and tear on planes and crews are minimized. Most important of all, the reduced requirement for fuel will enable the aircraft to carry greater pay loads over longer distances.

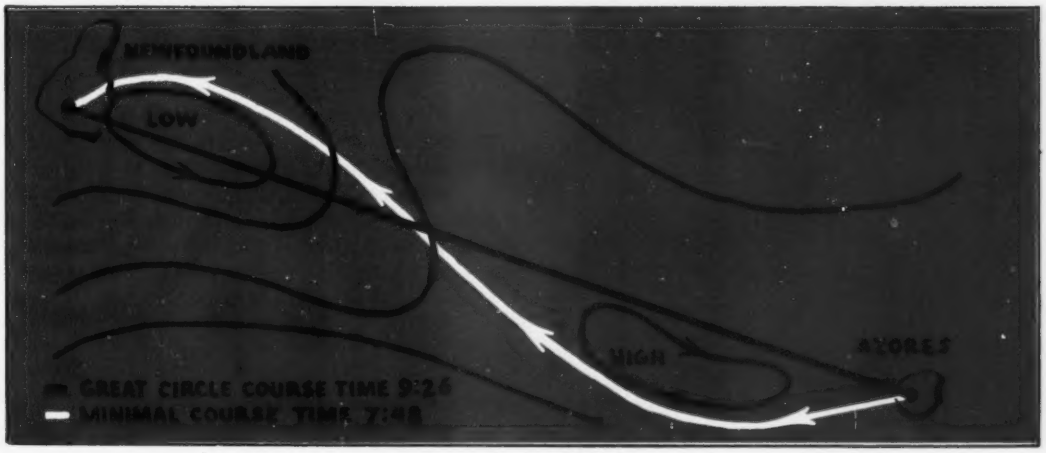
In the northern hemisphere winds flow in a clockwise direction around high pressure areas forming huge circular wind flow patterns. Low pressure areas form similar wind patterns rotating in the opposite direction. In certain areas the pressure distribution may cause relatively narrow streams of very high speed winds (commonly called "jet streams"). An aircraft, deviating from the direct course to fly with the wind around the appropriate side of a circular wind pattern, or changing course so as to fly in one of these jet streams may realize

tremendous assistance from the wind. Air Weather Service meteorologists utilize wind-flow charts to determine the wind-flow pattern and plot the aircraft's course so that, upon occasion, the time of the flight may be reduced by as much as 20 per cent. When these wind-flow charts are available to air crews on long flights, the simple techniques of the Minimal Flight Procedure enable any pilot to plot a minimal flight without the assistance of highly trained specialists or technicians.

Minimal flight techniques are most effective in flights over 1000 miles in length. Otherwise the required deviation in course may increase the flight distance to such an extent that the increase in ground speed is insufficient to compensate for the longer flight distance. Another consideration in minimal flight planning is the effect of latitude on pressure gradient. Due to rotation of the earth, an apparent force (known as Coriolis acceleration) normally causes an increase in pressure gradient with higher latitudes. Consequently, pressure values may be more easily determined and wind velocities more accurately calculated in northern latitudes.

For these reasons Air Weather Service conducted the experimental flights of the minimal flight project in the North Atlantic on flights to Europe. MATS C-54 Skymasters and C-121 Constellations were used in the surveys, flying scheduled trans-oceanic hops. The Berlin Air-Lift, with its heavy volume of trans-Atlantic traffic, made it possible to dispatch two aircraft simultaneously, one on a great circle flight and one on a minimal flight and compare the flight times. Under these ideal test conditions AWS was able to develop an efficient navigational technique.

With the tremendous increase in the effective range of the modern aircraft, the possibilities and importance of saving time by a calculated choice of routes, readily determined by minimal flight techniques becomes increasingly apparent.



Easily Identified—Idaho claims the world's largest aerial sign is at Coeur d'Alene. Spelled out on top of one of Coeur d'Alene's factories in letters 50 feet high, this aerial marker extends 446 feet along the roof of the factory. Fifty-four gallons of paint were used in production of this marker and pilots claim it can be read from altitudes as high as 13,000 feet.

◆ ◆ ◆

Government Airplanes in Use—Eleven departments of the Federal government, by the end of the coming fiscal year, will have acquired and put into use for a variety of purposes a total of 1,119 airplanes, exclusive of those used for military purpose.

◆ ◆ ◆

Rough Water Flying Boat—The Navy has awarded an initial production contract for a new "rough-water" seaplane designed primarily for anti-submarine warfare. The P5M-1 is to be built by Glenn L. Martin Co.

Ground Power Plant—An air transportable (type B-10) ground power plant for support of B-36 aircraft has passed a 300-hour endurance test and jet engine starting tests. Production of 103 of the units has been approved.

◆ ◆ ◆

GCA—The GCA unit at Wright-Patterson AFB has landed 10,000 planes without an accident since the unit was placed in operation in early 1947. More than 800 of these approaches were made under actual instrument conditions.

◆ ◆ ◆

B-45 Cargo-Bomber—The USAF has been considering using a B-45 on a freight carrying service in order to obtain data on the operation of a jet transport.

Pie For All—Many industries share our national defense air appropriations. In a typical case cited by the Air Force, 42 per cent of the funds appropriated for a plane went to the airframe manufacturer, while 58 per cent went to manufacturers of propellers, engines, armament, electronics, etc.

◆ ◆ ◆

Climbing Fool—Navy researchers have a rocket that climbs more than 51 miles (269,280 feet) in less time than it takes to cook a soft-boiled egg.

B-50 Refueling—Servicing crews are warned that the fact that fuel overflows from the filler necks of B-50 wing fuel tanks following a quick replenishing does not mean that the tanks are full. To insure that tanks are completely filled, it is recommended that a settling period of 10 to 15 minutes be allowed after the wing tanks have been filled. After the fuel has settled, fill the tanks to capacity.

◆ ◆ ◆

Personal Plane Output in 1949 totaled 3,358 aircraft valued at $14,300,000.

Transients Recognized—The Air Force has warned all its bases to take better care of transient personnel, and established a list of deficiencies for the special attention of inspectors general.

◆ ◆ ◆

More Farm Flying—Crop spraying, dusting, and seeding are among rapidly-growing agricultural aviation activities. According to a recent survey, 779 flight operators are engaged in these activities in the U.S.A. California leads with 96 operators; Texas is second with 82; and Florida third with 50.

Stall Warning Indicators—CAA estimates that at least 10,500 civil aircraft are either equipped with stall warning indicators or certified as stall-proof.

◆ ◆ ◆

Aeolipile—Think jet propulsion is the product of our fast moving era of flight? In 130 B.C., Hero demonstrated his aeolipile, which is considered by many as the first demonstration of the principle of jet propulsion.

◆ ◆ ◆

Aerial Ambulances—There are now at least 600 airplanes equipped as aerial ambulances in active operation in the United States and stationed at strategic points throughout the country, according to a special survey made by CAA.

Altitude Anti-G Suit—A combination altitude-anti-G suit has passed qualification tests at AMC and 250 are being procured for service test by CONAC.

◆ ◆ ◆

Supermen—Flight Safety Foundation points out that according to the record of 1946-48 the life expectancy of the airline pilot flying at the rate of 1000 hours per year is 300 years, while the life expectancy of the railroad engineer for the same period is 1100 years.

◆ ◆ ◆

IFR or VFR—According to a report received from CAA, of the first 4000 civilian aircraft accidents during 1948, 75 were classed as, "continuing visual flight into unfavorable weather." In plain language that means trying to fly visually when there is no visibility. Those attempts killed 41 of the 75 pilots and 63 passengers; they seriously injured six pilots and three passengers. Fifty-three of the planes involved were washed out.

Briefly Noted

The Air Force is again considering civilian contract school training of USAF pilots and technicians.

The XC-120, detachable fuselage version of the Packet, is expected to be ready for flight in April.

Over 150 cities have submitted bids for consideration for the site of the proposed Air Force Academy.

The Navy is expected to reveal three new supersonic carrier-based fighters during 1950. They are the XF10F, XF3H and the XF4D.

Eighty per cent of California's rice crop is sown from the air.

Blue prints required for ONE of our big bombers would cover 125 football fields.

Cross Feed

FLYING SAFETY
IDEA EXCHANGE

TECHNIQUE

By Major Herbert W. Ritter
Ellington AFB, Texas

After the pre-takeoff check has been completed the plane is lined up on the runway using brakes only. Why bother to jockey throttles to help turn onto the runway? The throttles are moved ahead simultaneously for a takeoff and then down the runway she goes. Directional control? Why sure! Just the brakes are needed; no need to kick rudder or wobble ailerons.

Let's carry the story further. Such braking technique for directional control on takeof also is used on landing. In other words—don't hold the stick all the way back, don't use full rudder, don't use a combination of rudder and brakes, and aileron too maybe,—use brakes, it's easier!

Look around you. Carefully observe how many pilots today use taxiing, takeoff, and landing techniques described above, relying solely on the brakes. Are you one of them? Lets consider an aircraft that is fairly well known for its "swerves," and see what has happened regarding the above technique.

It's the T-7, T-11, or C-45, of course, and you've read about it in accident briefs quite often. Some pilots say it swerves on all landings—as bad as the T-6 in a cross wind. The causes, they simply state: "Poor brakes, and no rudder control." So a technique to prevent swerves is practiced which leads directly to a type of accident so frequent in this type aircraft—landing gear failure!

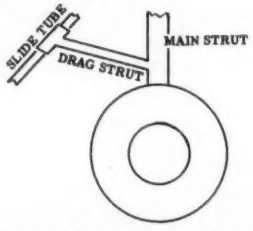
Utilizing minimum flaps and a high approach speed, a wheel, tail-high landing is made. The tail is then kept in the air as long as possible to assure rudder control. Should a bounce landing result, well—then the airplane is "plastered on" by pushing the stick forward. Mind you now, such technique prevents swerves—some pilots say. And then invariably they go on to argue that five years and 1000 hours experience in the plane should prove their argument to be valid enough. Little do they realize that a swerve can result just as readily with this technique as when attempting a three point or a tail-low landing. Furthermore, when the tail is allowed to settle to the ground most pilots do not hold the control wheel all the way back—*as far as it will go*. They allow the locked tailwheel to bounce along the ground!

This permits swerves because full use of the locked tailwheel for directional control is not obtained. Accident records will determine some of these facts.

Let's take a peek at the T.O.'s, 01-90KC-1, (Pilot Operating Instruction) for some controversial points on the T-7 and T-11. Though T.O.'s don't tell you WHY, there must be some reason for each of the following: Briefly, Tech Order 01-90KC-1 says that "(1) Wing flaps should be DOWN. (2) Normal, power off, three point landing is best and; (3) The airplane has no tendency to swing after landing." At this point a thousand voices are undoubtedly saying "like hell it doesn't," however, let's be open-minded about this problem and hear the whole story.

It can be safely stated that many expensive accidents occur each year in this aircraft due to LANDING GEAR FAILURES. I do not believe swerves or groundloops are the primary causes. Something must be wrong. Accident reports invariably state that, (1) The casting attaching drag strut to main strut was broken allowing gear to swing free. (2) The slide tube was bent and the gear could not be extended, etc. Perhaps the T.O.'s are right when they state that the three point landing for the T-7, T-11, and C-45 are best. However, it must be admitted here that a wheel, tail-low landing is easier for many pilots to perform.

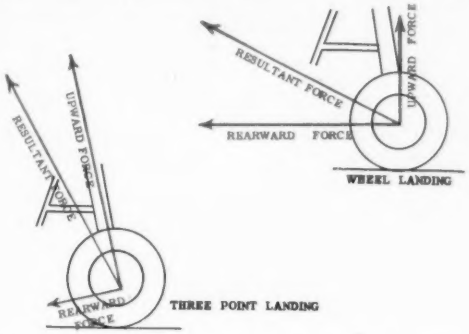
How many of you birdmen have ever stopped to notice the type of landing gear on this aircraft or any other you've flown? A diagram of the T-7 or T-11 gear will show you:



Now notice which is the heaviest strut. It's the main one, of course, and this strut is designed

to take the greatest shock on landing—a tail-low or three point landing. The drag strut is small, attached well above the axle, and therefore not built to withstand the rearward forces imposed in tail-high landings. (high speed landings).

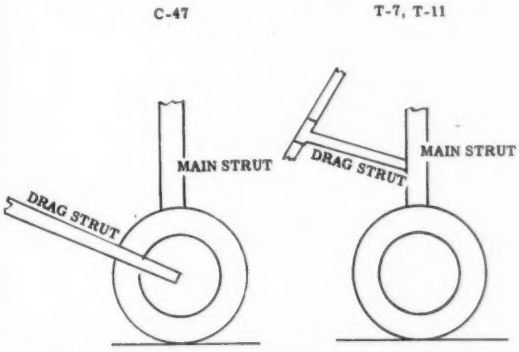
It can be readily seen that a wheel, high-speed landing—especially those requiring forward stick pressure to "plaster it on" after a bounce landing



imposes more forces on the drag strut than it's designed to carry. Result? Landing gear trouble.

Now let's compare different landing gear designs— -

Notice that the drag strut on the C-47 is attached to the axle — not high up on the main strut like a T-7. Therefore it can be seen that the C-47 gear will withstand the shock of a wheel, tail-high, high-speed touchdown much more readily than the T-7. In other words the C-47 gear was designed to withstand the forces involved in a three-point



landing as well as a wheel landing. It should be obvious now that the T-7 gear was designed for only tail-low or three point landings.

Perhaps pilots with that certain technique in the T-7 had better do some considering. As for the "built in swerve" known to so many, well, any conventional gear type aircraft will swerve under some conditions—mainly unanticipated cross winds. Proper technique and skill can prevent more swerves in conventional gear aircraft. Here are a few pointers:

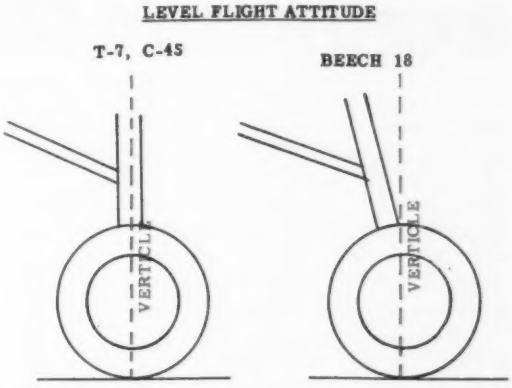
1. Hold the stick all the way back once the tail has settled to the ground. This keeps the tail from bouncing along and utilizes to the fullest extent the directional effects obtained from a locked tail-wheel—"plastered" to the ground.

2. Crank aileron all the way over into the cross wind to aid in directional control (ever heard of this?).

3. Utilize full rudder travel and then brake or combination thereof, to help keep the aircraft rolling straight.

4. Easy on those throttles.

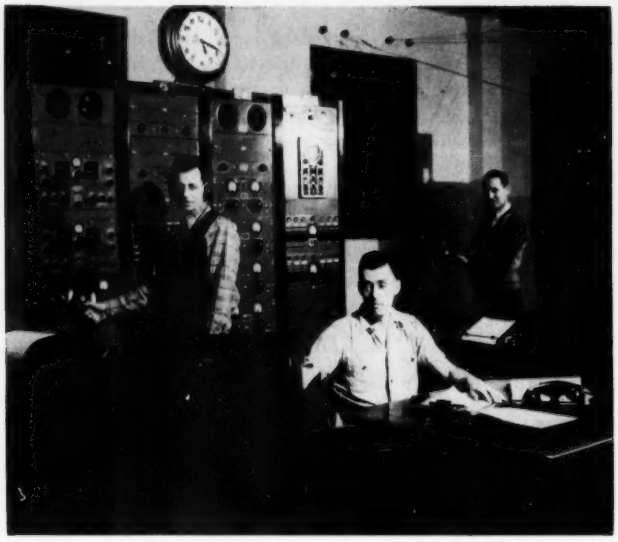
The new Beech 18, executive type transport aircraft is similar in every respect to the Air Force T-7's and C-45's except for one thing—the landing gear installation! Comparative diagrams of the



T-7, C-45 landing gear vs. the Beech 18 landing gear can best illustrate my point.

As can readily be noted the Beech 18 landing gear has been redesigned to withstand better the forces imposed during a wheel landing.

This point, I believe, should further add to my argument. Also, the Beech Aircraft Corporation has pointed out that, for all around satisfaction, a tail-low landing, on the wheels, can be made at a low speed almost approaching the stall speed. It can be made so that the tail can be lowered immediately to the ground to provide good directional control by means of a locked tailwheel. In the opinion of Beech engineers and pilots, this is the most satisfactory method of landing the airplane. They also feel that there is no question that the majority of landing gear failures in the past have been due to high speed landings for which the airplane was not originally designed and which loaded the landing gear to stresses far beyond the original design factor.



ACCURATE POSITION REPORTING

THE Civil Aeronautics Administration has recently received complaints from several CAA regions that air traffic controllers are having trouble making accurate estimates of the progress of IFR flights in spite of their best efforts to compute the actual and future positions of the airplanes accurately. In a number of cases this difficulty is caused by improper flight planning and poor navigation which results in inaccurate position reporting by pilots. It shouldn't be necessary to emphasize the importance and necessity of control of air traffic to pilots. However, it is obviously necessary to emphasize to both civil and military pilots alike the necessity for accuracy in making control possible. To combat the problem of inaccurate position reporting, the CAA prepared information for publication in "Flight Information Manual" and in the "Airman's Guide."

For the benefit of our readers who are pilots, particularly those who are unsure of their positions, FLYING SAFETY joins forces with CAA with the hope of promoting accurate position reporting by publishing this material prepared by CAA:

"Position Reportings: The safety and effectiveness of air traffic control depend to a large degree on accurate position reporting by pilots. In order to provide the proper separation and expedite aircraft movements, ATC must make accurate estimates of the progress of every aircraft operating on an IFR flight plan. Unless pilots make all their required position reports promptly and accurately, it is impossible for controllers to compute accurately the actual and future positions of flights, sometimes with the result that traffic conflictions cannot be foreseen. An error of even one minute in position reporting can result in delays or in separation which is less than the required minimum.

When making en route position reports, pilots should be sure that their time setting is correct. The correct time should be obtained from the tower before takeoff. Also the time of passing a reporting point should be given to the nearest minute. Care should also be taken that the reporting point is identified correctly and accurately. When an aural or light-panel indication is used to determine the time of passing a reporting point such as a fan marker, "Z" marker, cone of silence, or intersection of range courses, the time should be noted when the signal is first received and again when it ceases. The mean of the two times should then be taken as the actual time over the fix. If the position is given as a distance and direction from a reporting point, the distance and direction should be computed accurately.

In connection with position reporting, few pilots are aware of the fact that *a change in true airspeed constitutes a change in flight plan.* As such, a proposed variation in true airspeed must be reported to ATC.

Position reports should be anticipated. Pilots should run the report over in their minds at least once before transmission, using the sample position report printed on the inside back cover of the Radio Facility Chart as a guide."

Be sure that you *are* where you know you are.

Once is enough!

These are actual experiences by USAF pilots. If you have had an experience that taught a lesson, send it to the editor of FLYING SAFETY Magazine.

In landing a B-26, I disregarded the caution from the tower as to my proximity to another B-26 in front of me in the traffic pattern. On the final approach, my gliding speed exceeded that of the other B-26 and in a very short time, the distance between us was cut down to a dangerous margin. The tower again cautioned me to either turn out of the pattern or go around. These instructions I again disregarded. It so happened that at this particular time, the surface wind was 30 to 40 miles an hour and extremely gusty. The other B-26 landed approximately 100 yards in front of me, and at about that same time, I entered his slipstream.

In my effort to cut down the gliding speed so that a safe distance remained between us, I had slowed the airplane to below the minimum safe speed for a B-26 and stalled out in his slipstream approximately 50 feet above the ground. It was only because the B-26 broke clean of the stall that I landed right side up. As it was, the impact with the ground was so great that all my radio equipment was broken, and I momentarily lost control of the airplane.

Since that time I have always heeded the advice of the control tower operator and paid strict attention to my airspeed.

• • •

While en route from Albuquerque to Wright-Patterson Air Force Base in a B-25 in which I was cruising at 9000 feet, I became very sleepy, and inasmuch as the copilot had proved himself to be quite competent, I turned the aircraft over to him and went to sleep. Before I started my nap, I told him to wake me up ten miles out of Wright-Patterson AFB. When he finally aroused me, he had descended and entered the traffic pattern, and we were on the downwind leg. I immediately dropped the gear, decreased my power, and went through a very rapid cockpit check, turned on the base leg and on the final approach. The approach was quite steep, and in order to land on the first third of the runway, I had to make a steady power reduction all the way down to the ground.

After I had landed, I was instructed by the control tower to make an 180 degree turn, go back to the taxi strip, and turn off the runway as there was another plane on final approach. It was then, when I attempted to open the throttles to make the 180 degree turn, that both engines quit, and just about that time, I observed that the mixtures were in automatic lean.

Had I attempted to use throttle to drag the airplane in on final approach, there was an excellent possibility that one or both engines would have quit which would have meant curtains right then and there for me and my copilot.

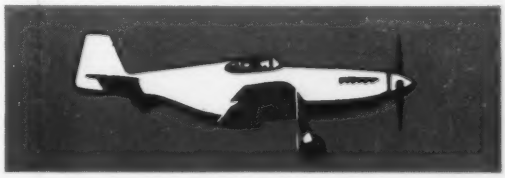
I learned a lesson that I won't ever forget. I also figure that a bed is about the smartest place to do my sleeping.

• • •

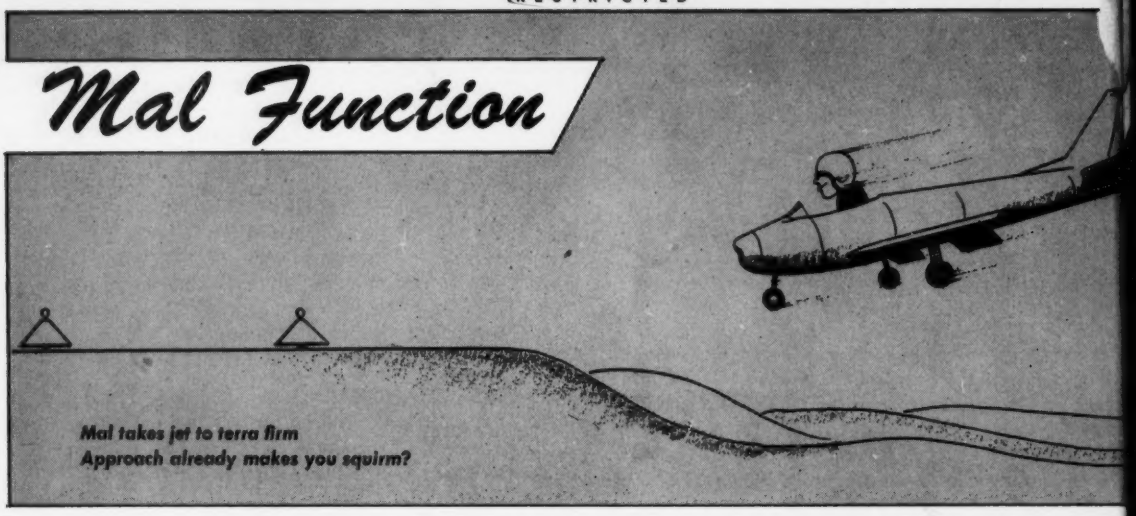
Prior to departing on a flight in an F-51, I placed my brief case underneath the seat. The flight was uneventful, but after turning on final approach, I realized something was jamming the stick so that I could not move the ailerons.

It was my first cross-country trip in an F-51, and I was landing with a belly tank which was almost full. The gusty air on final approach and the aircraft mushing out faster than I had anticipated and finding my ailerons locked, was an experience I won't forget for a long time.

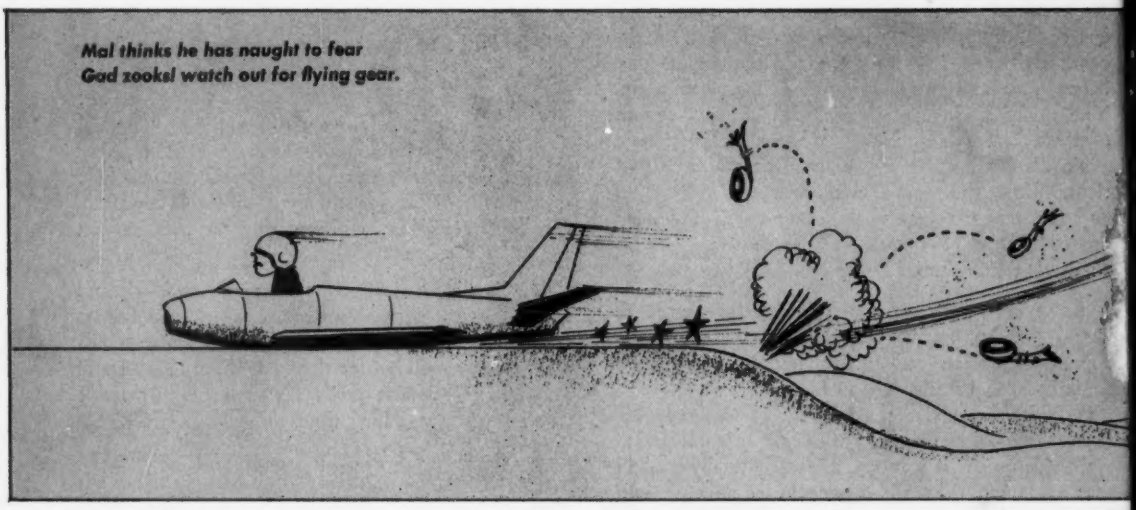
What happened, of course, was very simple, but it showed that I had slipped up a little in my headwork. When I had placed the brief case under the seat, the aircraft was in a three-point position on the ground and there was nothing to cause the brief case to slide forward until I stuck my nose down on the final approach when by the simple law of gravity, the brief case slid forward. All I can say is that I'm mighty sure now to see that no luggage or equipment is placed anywhere in the aircraft where it can possibly slide or be jarred into a position where it will interfere with the controls.



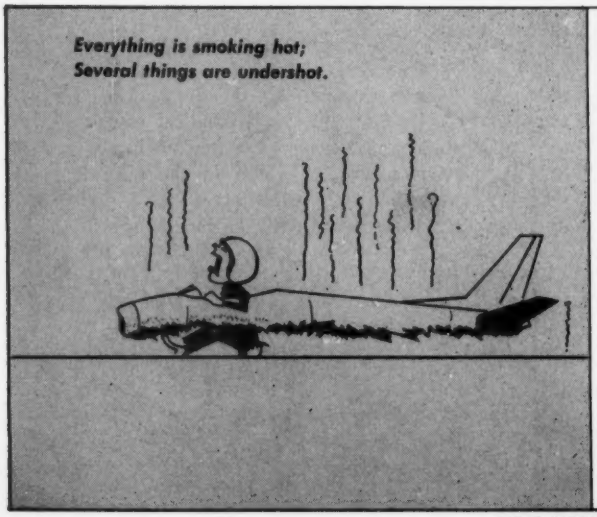
Mal Function



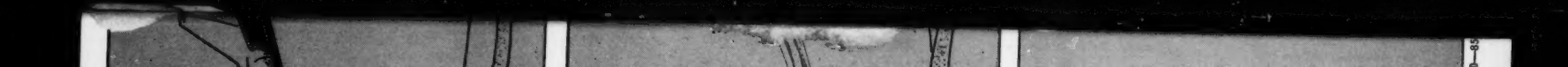
Mal takes jet to terra firm
Approach already makes you squirm?



Mal thinks he has naught to fear
Gad zooks! watch out for flying gear.



Everything is smoking hot;
Several things are undershot.

Mal gets treatment for his tail.
Really head should get the pail.

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